we question the wisdom of not allowing these Manchester lectures to be self-supporting. Working men are now absolutely better paid than the great majority of clerks and *employés* in the Civil Service, and their expenditure is less heavily taxed than those who esteem themselves in a higher social scale. Mechanics and others can therefore well afford to pay whatever is necessary for these lectures, and we cannot but think it is an unwise thing to establish the idea that fustian can have for a penny what is charged sixpence or a shilling to cloth. If a penny entrance-fee is too firmly rooted to be dislodged with impunity, boxes might be put in the room for contributions by the audience, who might be urged to make the lectures self-supporting. Moreover, the profits on the sale of these reports of the lectures must be large and ought to go some way towards meeting the expense of the lectures themselves. After all, the main secret of success in any popular lecture scheme is to have some one responsible person, like Prof. Roscoe, who, year after year, has unsparingly used his influence and his time in this good cause.

We must add a few words about the books before us. When upon opening our parcel we found the editor of Nature had sent us these lectures with a request for a review of them, we felt he had set us to a hopeless task. What sane solitary reviewer dare venture to criticise the collective wisdom of Professors Huxley, Tyndall, Roscoe, Gladstone, Geikie, Balfour Stewart, Odling, Clifford, W. C. Williamson, Wilkins, Ward, Jevons, Drs. Carpenter and Huggins, Mr. Spottiswoode, Sir John Lubbock, and other famous men who make up the brilliant array of Manchester lecturers?

It is hardly needful to say that all the lectures in these volumes are good, and some well repay careful perusal. Many of the lectures are so fascinating that it is difficult to put the volumes aside. What, for instance, can be more charming than Prof. Geikie's lecture on the Ice Age in Great Britain, or Sir John Lubbock's lecture on Modern Savages, or Prof. Stewart's on the Sun and Earth? And we envy those who were present at such experimental lectures as Prof. Tyndall's on Crystalline Forces, Prof. Abel's on Gun Cotton, or at Prof. Roscoe's or Dr. Huggins', and others we have not space to name. The books before us are therefore well worth preserving, for though the lectures are popular they are in no instance claptrap; and whilst within the comprehension of all classes, they will also be found not unworthy of perusal by men of culture.

Mr. Pitman, who reported the lectures, has evidently done his work faithfully and well, and Mr. Heywood who publishes them has clothed the volumes in a new and attractive dress.

We would venture, however, to suggest to Prof. Roscoe—whose name at the foot of each preface is the only editorial mark—that it would be desirable to have a responsible editor when such permanence, as these volumes indicate, is given to the lectures. Reading one of Dr. Carpenter's lectures, for example, there is a continual reference to diagrams and maps which, though present to the audience, are not so to the reader; and to some other lectures the same remark applies. Moreover, before binding up the lectures, the authors, we think, ought to have been informed that a volume was to be issued, and so the opportunity afforded them of making any corrections or additions to their lectures they might find necessary. Then a better table of contents of each volume would be an advantage, and the names of the lecturers should be attached to the titles of the lectures in the contents. In the first series the names of those who gave the short courses on Chemistry, Zoology, and Physiology are entirely omitted both in the index and in the lectures themselves. A reader opening on p. 119 of the first volume finds the course on physiology beginning, "The subject, my friends, upon which I am going to speak to you this evening, &c.," but who the speaker is he will be perplexed to find. Incidentally the omitted names happen to be mentioned by Prof. Roscoe in the preface. Such little matters as these might readily be amended by proper care on the part of the publishers.

W. F. B.

RECENT AUSTRALIAN EXPLORATIONS

Explorations in Australia; with an Appendix on the Condition of Western Australia. By John Forrest, F.R.G.S. (London: Sampson Low and Co., 1875.)

DURING the last three years there has been an admirable activity among the Australian colonists in the exploration of the great tract of unknown land in the centre of the southern continent. It was long ago surmised that this interior was either occupied by a great lake or lakes, or was in the main a barren desert, but only within the last two years has its real condition been conclusively demonstrated. The most prominent names in recent exploration are those of Giles, Gosse, Ross, Lewis, Warburton, and Forrest. The first two were baffled in their attempts to cross the country; even though Gosse was provided with camels, he only reached close on the 130th degree of E. long. when he had to return eastwards. Ross, in 1874, explored a considerable previously unvisited tract to the S.W. of the Neale River, while Lewis explored, in 1874-5, the region to the W., N., and N.E. of Lake Eyre. Col. Warburton has the honour of having been the first to cross the country, starting from Alice Springs on the telegraph line in April 1873, and eight months after, reaching the west coast. His narrative we noticed in vol. xii. p. 46. Mr. John Forrest though yet a young man, has perhaps done more than any recent explorer to make known the real nature of the hitherto unknown or imperfectly known regions. He is, we believe, a native of West Australia, a member of the Colonial Survey, and well qualified in every respect for the trying task of Australian exploration, and the Colonies would do well to make liberal use of his services in order to obtain a satisfactory idea of the resources of their country.

The volume before us contains an account of three separate exploring journeys made by Mr. Forrest. The first of these was a comparatively short trip to the north-east from Perth, as far as the 123rd degree of E. long., accomplished between April and August 1869. The object of this journey was to endeavour to find some traces of the unfortunate Leichardt, who twenty-seven years ago quitted Moreton Bay to cross the continent, but whose fate is still a mystery. We need hardly say that Mr. Forrest's journey was in vain, so far as this object is concerned, though he brought back much valuable information concerning the country traversed. The latter portion was over comparatively unknown ground; and Mr. Forrest discovered a remarkable series of salt lakes extending from about 119° to 122° E. long., and between 28° and 29° S. lat. The country is somewhat hilly along the 29th parallel, with granite and sandstone rocks. Here he was on the edge of the dreary spinifex desert which has daunted so many explorers.

Mr. Forrest's second journey was a much more important and extensive as well as hazardous one; it was indeed along the same route as that in which the dauntless Eyre suffered so terribly thirty-five years ago. With a small party, and after making excellent arrangements with a vessel to meet them at a certain point, he set out from Perth on March 30, 1870, came S.E. to the coast, and travelled along the great Australian Bight, reaching Adelaide on Aug. 24, without loss. He kept considerably more inland than did Eyre, and was in every respect more fortunate, though there was frequently considerable suffering from want of water. His report of the country traversed is much more favourable than Eyre's; large grassy tracts, extending many miles inland, being found along nearly the whole length of the Bight. Water is the great want, yet, since Forrest's journey, settlers have been attracted to the region, and we believe preparations are being made to connect West Australia with the eastern colonies by means of the telegraph.

Mr. Forrest's third journey was a much more formidable undertaking, and in all respects of more importance than either of the two previous ones. Its object was to discover decisively the real nature of the mysterious interior, and thus make an important contribution to scientific knowledge, as well as to let the Australians know what are the resources of their immense continent, not much less in area than continental Europe. The expedition was carefully organised, though it did not cost much above 600*l.*, and consisted of four white men, two blacks, and a large number of horses to carry provisions, equipment, &c., as well as for riding. The party set out from Perth on March 18, 1874, and after reaching 26° S. lat. in 117° E. long., proceeded in a generally eastward direction along that parallel, until on Sept. 27 the telegraph line was struck in 27° 7′ 50″ S. lat. Mr. Forrest's route was thus on an average about 400 miles S. of that of Colonel Warburton. After the first few entries in his journal, Mr. Forrest's narrative becomes somewhat tedious from its sameness, though the intelligent and energetic leader is not to blame for this. As has been the case with nearly all previous inland Australian expeditions, the daily occupation of the present one was to hunt for water; this is the burthen of every day's entry in the journal. Mr. Forrest has the same tale to tell as Colonel Warburton had of the more northerly route—apparently endless spinifex plains, varied with sand-hills, sandstone cliffs, granite rocks, a few trees, and, in Forrest's case, with rare grassy plains, but with scarcely enough of water all the way to fill a fair-sized mill-pond. Forrest's party, however, notwithstanding that they had no camels, fared much better, both in the matter of food and drink, than did Warburton's; only one of the horses actually died, and comparatively few had to be abandoned. Once only were they attacked by the natives, who were dispersed by a shot or two that did little damage. Not many natives were met with, though signs of them were frequently seen, and they seem to have been watching the expedition along most of the route.

Mr. Forrest sums up the results of his third journey as follows:—

> "The whole of the country, from the settled districts near Champion Bay to the head of the Murchison, is admirably suited for pastoral settlement, and in a very short time will be taken up and stocked; indeed, some already has been occupied.
>
> "From the head of the Murchison to the 129th meridian, the boundary of our colony, I do not think will ever be settled. Of course there are many grassy patches, such as at Windich Springs, the Weld Springs, all round Mount Moore, and other places; but they are so isolated, and of such extent, that it would never pay to stock them. The general character of this immense tract is a gently undulating spinifex desert—*Festuca* (*Triodia*) *irritans*, the spinifex of the desert explorers, but not the spinifex of science. It is lightly wooded with acacia and other small trees, and, except in a few creeks, there is a great absence of any large timber.
>
> "The prevailing rock, which crops out on the rises and often forms low cliffs, in which are receptacles for holding water, is *light red sandstone* (desert sandstone, tertiary). The only game found in the spinifex is a kangaroo rat, commonly called the 'wirrup;' but in the grassy openings there are many kangaroos, and often emus, also a rat known as the 'wurrung.' These animals are very good eating, and formed a valuable addition to our store department. At the permanent waters there were always myriads of bronze-winged pigeons, and also the white cockatoo with scarlet crest, called the 'chockalott;' also the 'beaccoo,' or slate-coloured parrot. Generally, however, with the exception of the crow and hawk, birds were not very numerous except round water. Whenever a sheet of water was found we found ducks, and in Lake Augusta swans and ducks were innumerable."

Though the expedition became ultimately a race for water and life, yet Mr. Forrest found opportunities of carefully noting some of the principal features and productions of the country passed through, and the geologist and botanist especially will find a good deal in all the three narratives to interest them. There are a few spots on the cross-country route of Forrest where a well-provisioned expedition could encamp for months; and if the Colonial Government were to follow the advice recently given by the German Commission in reference to Arctic exploration, and send out a properly equipped scientific expedition to a suitable centre from which varied observations could be made, the scientific, and therefore the practical results, would, we believe, be of great value. This, we think, is the method that ought now to be pursued, at least in conjunction with ordinary exploring expeditions.

Mr. Forrest has made in his three narratives a contribution of high value to the literature of Australian exploration. We are glad to see he has met with so much honour in his own country, though there was no occasion to increase so largely the bulk of his work by newspaper reports of the various meetings held in his honour. Appended are a scientific list, by Baron von Mueller, of the plants collected in the third expedition; a report, by Mr. Brough Smyth, on the geological specimens; and General Weld's report, of September 1874, on the condition of Western Australia, with three pages of statistics.

The maps of the three routes deserve a word of praise. They have been plotted with great care, and the notes along the route are so numerous and full of information, that they form an admirable epitome of the whole work. The few illustrations are interesting; that especially of the Spinifex Desert gives one a good idea of this horror of Australian exploration.

OUR BOOK SHELF

Official Guide-book to the Manchester Aquarium. By the Curator, W. Saville Kent, F.L.S., F.ZS. Third edition. Twentieth thousand. (Michaelmas, 1875.)

THE Manchester Aquarium, situated in the Alexandra Park of that city, has now been opened to the public for more than two years, and has attained considerable success, although we believe it has not quite realised the expectations formed of it by its original promoters. Next to the Brighton Aquarium, that of Manchester is the largest amongst the six principal institutions of this kind existing in the country. The series of tanks, including the deep sea, shallow, and fresh-water groups, is sixty-eight in number, surpassing that of any other aquarium, while their linear frontage falls little short of 700 feet, which is but slightly less than that of the well-known establishment at Brighton. The building itself is of the plainest possible design, and at first sight seems as if it had been originally destined for a church of some kind. It consists of a high central oblong nave and two narrow side aisles. Being lofty and well lighted, however, it affords excellent accommodation for the smaller tanks which line it on both sides, as well as for the two fine large tanks, upwards of forty feet in length, which are situated at the two extremities. The proprietors of the Manchester Institution have been moreover fortunate in securing the services of a competent scientific naturalist as its director, an advantage shared by few if any of the sister establishments. Mr. W. Saville Kent transferred his services from Brighton to Manchester some two years ago. One of the last things he did at Brighton was to prepare the excellent Handbook to the Aquarium there which has been already noticed in this journal. We have now before us a copy of the third edition of the same author's "Guide-book to the Manchester Aquarium," prepared somewhat after the same fashion. After a few words of introduction describing the building and the general management, the sixty-eight tanks and their contents are discussed successively. A large amount of information upon the various fishes and other animals which they contain is thrown together in a very popular and readable form, and woodcuts are introduced illustrating the more attractive and noticeable objects exhibited. The Guide-book is concluded by a chapter on the principles of management of aquaria generally, which cannot fail to be of service to those who are interested in such matters, and which proves that Mr. Kent is fully master of the subject of which he treats.

Elementary Science Manuals. Botany for Schools and Science Classes. By W. J. Browne, M.A. Lond. (Belfast: W. Mullan, 1875.)

AN unfavourable impression of this little book is created at first sight by the obvious imitation, in the style in which it is got up, of Macmillan's series of "Science Primers." Such a plagiarism may generally be taken as a confession on the part of author or publisher that the work has not sufficient merits of its own to stand without adventitious assistance. This, however, is not the case in the present instance; and our depreciatory criticisms are almost exhausted. We had, it is true, marked certain passages in the margin for correction; but they are but few. The most important is the resurrection of the old blunder (twice over) of the existence of "spongioles" at the extremities of the root-fibres; and this is the more remarkable as the work from which the illustrative woodcut is copied does not make this mistake. The statement in the preface, however, that the book "contains all the subjects required for the First B.Sc. Examination in the University of London," must be taken *cum grano.* There is no index; and the deficiencies have therefore to be made out by careful inspection; but we find no description whatever of the process of fertilisation (although there is a diagram to represent the entrance of the pollen-tube into the embryo-sac), and no adequate one of that of respiration, this term being erroneously applied, as is so often the case, to the process of assimilation. But what can you expect for eightpence? You get, at all events, a great deal for your money; and the morphological and structural portion is on the whole so well done as to render the little book of great use to the beginner. Indeed we do not know any purely elementary work in which this part is more satisfactory. A few technical errors will doubtless be noticed and corrected in future editions. The illustrations, seventy-six in number, though not new, are very good and serviceable.

A. W. B.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

Hoffmeyer's Synoptic Weather Charts

WILL you kindly draw the attention of your readers to the fact that the second year of Capt. Hoffmeyer's synoptic charts of the weather in Northern Europe and Atlantic, commencing with Dec. 1874, is now about to be issued.

The subscription, as before, will be 12*s.* 6*d.* per quarter, including postage of the monthly parts.

I shall be glad to receive names of gentlemen who are willing to encourage the undertaking, which is carried on at Capt. Hoffmeyer's own expense. ROBERT H. SCOTT, Director

Meteorological Office,
116, Victoria Street, London, S.W.

Collomia

ON reading Mr. Duthie's communication (vol. xii. p. 494) on the capsules and seeds of *Collomia*, I presumed that some one would be ready to indicate the use of the mucilage and threads of the seed-coat; but I now notice that Mr. Bennett (vol. xii. p. 514) supposes that it "still remains to be discovered." An obvious and sufficient explanation will be found in A. Gray's "Structural and Systematic Botany," as far back as the edition of 1845. In the later editions, all of them now old, it is twice referred to. On p. 40, after mentioning that these gelatinous threads, or the like, occur on many seeds or seed-like fruits of various orders, it is said: "They may subserve a useful purpose in fixing light seeds to the ground where they lodge, by means of the moisture of the first shower they receive." And on p. 321, where forms of this apparatus are described, it is added: "This minute mechanism subserves an obvious purpose in fixing these small seeds to the moist soil upon which they lodge, when dispersed by the wind."

The seed of a *Collomia* or *Gilia*, when wetted, forms a *limbus* of three or four times its diameter; this would involve a multitude of grains of sand, and ballast the seed most effectually in the situations where or at the time when alone it could germinate. A. GRAY

Herbarium of Harvard University,
Botanic Garden, Cambridge, Mass., Nov. 16

Sir Thomas Millington and the Sexuality of Plants

IN your article last week on the Oxford Botanic Garden, reference is made to Sir Thomas Millington, the Savilian Professor of Botany, as having in 1676 "first divined the fundamental fact of sexual reproduction in flowering plants." In a review in the columns of the *Academy*, of the English edition of